



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,690	02/11/2004	Tao Wu	102282-15	3833

21125 7590 08/08/2007  
NUTTER MCCLENNEN & FISH LLP  
WORLD TRADE CENTER WEST  
155 SEAPORT BOULEVARD  
BOSTON, MA 02210-2604

EXAMINER

KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
----------	--------------

2882

MAIL DATE	DELIVERY MODE
-----------	---------------

08/08/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/776,690

Applicant(s)

WU ET AL.

Examiner

Chih-Cheng Glen Kao

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 1-34 are rejected under 35 U.S.C. 102(a) as being anticipated by Wu (Three-Dimensional Mammography Reconstruction Using Low-Dose Projection Images).
2. Regarding claims 1, 15, and 25, Wu discloses a method, system, and computer readable medium encoded with a computer program for imaging, comprising acquiring radiation absorbance images of a target element by moving a radiation source through a limited plurality of angles with a source and detector (fig. 4.1), applying an iterative reconstruction algorithm to the radiation absorbance images to generate a three-dimensional reconstruction (title) of the target element using tomosynthesis (pg. 29), and displaying at least a portion of the three-dimensional reconstruction of the target element on a display (fig. 4.13), wherein the iterative reconstruction algorithm is applied using cone-beam forward projection and back projection (pg. 29).

3. Regarding claim 2, Wu further discloses wherein the radiation absorbance images are acquired by transmitting x-ray energy from an x-ray source (fig. 4.1, x-ray tube) through the target element to an x-ray detector (fig. 4.1, digital detector).

4. Regarding claims 3, 16, and 26, Wu further discloses wherein the x-ray detector is a digital x-ray detector having a plurality of detector pixels (fig. 4.1, digital detector).

5. Regarding claims 4, 17, and 27, Wu further discloses wherein radiation absorbance images are acquired through a number of angles less than or equal to about 100 (fig. 4.1).

6. Regarding claims 5, 18, and 28, Wu further discloses wherein radiation absorbance images are acquired through a range of angles that is limited to only between about 30 and 120 degrees (fig. 4.1).

7. Regarding claims 6, 11, 19, 24, 29, and 34, Wu further discloses wherein the iterative reconstruction algorithm is a maximum likelihood algorithm implemented using an expectation-maximization algorithm (section 4.4.1).

8. Regarding claims 7, 20 and 30, Wu further discloses wherein the three-dimensional reconstruction of the target element is represented as an array of voxels having a uniform or non-uniform size in three-dimensions (section 5.6.1).

9. Regarding claims 8, 21, and 31, Wu further discloses wherein a forward projection step is implemented by ray tracing from the x-ray source to a detector pixel and the forward projection of the target element is obtained by repeating the ray tracing for each detector pixel to calculate an attenuation value for each voxel (pg. 32).

10. Regarding claims 9, 10, 22, 23, 32, and 33, Wu further discloses wherein a back projection step is implemented by locating detector pixels containing attenuation information relating to a selected voxel and using those pixels to update the attenuation value of the selected voxel, and wherein the back projection step includes performing a back projection for at least each voxel corresponding to a three-dimensional reconstruction of the target element (pgs. 36-37).

11. Regarding claims 12 and 13, Wu further discloses wherein the target element is at least a portion of a human patient, and wherein the target element is a breast of a female patient (title and fig. 4.1).

12. Regarding claim 14, Wu further discloses wherein a number of iterations is less than or equal to about 10 (section 4.4.3).

#### ***Response to Arguments***

13. Applicant's arguments with respect to claims 1-34 have been considered but are moot in view of the new ground(s) of rejection.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2882

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Chih-Cheng Glen Kao  
Primary Examiner  
Art Unit 2882